MESHTEK®

MeshTek® BLE-Ethernet-WiFi-USB Gateway

User Manual
Revision 1.2

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TO OUR VALUED CUSTOMERS

It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your iLumi Solutions, Inc. products. To this end, we will continue to improve our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

Please note: Images used in the manual are for reference purposes only and may be different than actual product.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via Email at support@ilumisolutions.com. We welcome your feedback.

Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of the document to which it applies.

To determine if an errata sheet exists for a particular device, please check with one of the following:

- Contact MeshTek team
- Contact your local MeshTek sales representative

When contacting a sales office, please specify which device, revision of MeshTek Gateway, user manual and data sheet (include literature number) you are using.

This document serves as the User Manual and Development Guide for the MeshTek Gateway. The document includes specifics on the software architecture and how to use the Gateway.

Chapter 1 **Overview**

The MeshTek Gateway is a Bluetooth Low Energy ("BLE") to Wi-Fi IoT gateway. It allows users to control and monitor various MeshTek devices from a mobile app or cloud. The MeshTek Gateway supports both Ethernet and Wi-Fi for connectivity to the local network and the internet.

MeshTek Gateway is required for installations / setup consisting of more than 20 MeshTek devices (end nodes) due to limitation of Bluetooth present on iOS / Android phones.

1.1 Definitions

This section defines some terminologies used with MeshTek technology:

- MeshTek Gateway: An OpenWrt unit supporting both BLE and Wi-Fi. Referred to as "Gateway" throughout the document
- Mesh node: A BLE peripheral that has mesh connection capability

The Bluetooth present on the MeshTek Gateway is the master which initiates a mesh network so that each mesh node can communicate not only with its neighbors but also other mesh nodes beyond its radio range. Mesh mode can be enabled and disabled programmatically. When mesh mode is enabled, mesh nodes can send data to each other through BLE connections.

1.2 MeshTek Gateway

- Representation of end user interface and connectors available on MeshTek Gateway is shown

Connectors / Buttons	Description
USB	Micro-USB, power input (5.0VDC, 1.2A)
RJ-45	10/100Mbps Ethernet
Tactile Switch 1 (Reset)	Button to reset wireless module
Tactile Switch 2	TBD

Top LEDs present on the MeshTek Gateway indicates following status:

LEDs	Status
Blue LED blinking, 1 sec ON/OFF continuously	Ethernet is plugged in and Internet is working
Blue LED blinking, 0.5 sec ON/OFF continuously	Ethernet is not plugged in and Internet is not working
Red LED blinking, 1 sec ON/OFF continuously	Socket connection is successfully established between Mobile App and Gateway is successfully
Red LED blinking, 0.5 sec ON/OFF continuously	Socket connection not established

Chapter 2 **Features**

2.1 General

- 5VDC, 1.2A input via micro USB
- 10/100 Ethernet
- Firmware upgrade Over-the-air ("OTA")
- Multiple data transportation protocols
  - o TCP/UDP (local network)
  - o Remote Server / Cloud: SQS with SSL and TLS certification (when Gateway is connected to Internet)
- Operating temperature: -10°C to 50°C

2.2 Wi-Fi-Ethernet

- Wi-Fi module is based on the QCA4531 MIPS 24Kc processor operating at up to 650MHz clock rate
- Wi-Fi Standards: 802.11a/b/g, 802.11n
- MIMO Configuration: 2x2 (2-stream)
- Max output power: +20 dBm
- 32 MB Flash and 64 MB DDR2 RAM
- 1 x USB 2.0 host (Same port at micro USB)
- 1 x Ethernet

2.3 BLE

- MeshTek-H52 Bluetooth 5.0 ready module based on Nordic's nRF52832 (ARM® Cortex™-M4 CPU 64MHz 32-bit processor)
- Max output power: +18.9 dBm
- Proven BLE Mesh Technology with over 30,000 MeshTek networks installed in the world
- The only BLE solution with the Auto Firmware OTA Update in a meshed network
- The only self-healing BLE mesh for high data transfer and reliable communication
- Built-in high range antenna with up to 200-meter range with reliable and secure meshing
- Can control up to 150 MeshTek devices / MeshTek enabled nodes

Chapter 3 **Electronic Parameters**

Recommended Operating Condition	
Power Supply (VCC)	5VDC
Operating Temperature	-10°C to 50°C

Absolute Maximum Rating	
Power Supply (VCC)	5.5VDC
Storage Temperature	-20°C to 80°C

Wi-Fi RF Performance	
Wireless	IEEE 802.11b/g/n
Data Speed	• Data speed (IEEE 802.11b): 1Mbps, 2Mbps, 5.5Mbps, 11Mbps • Data speed (IEEE 802.11g): 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps • Data speed (IEEE 802.11n): up to 150Mbps
Frequency Band	• 2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) • 2422MHz~2452MHz (802.11n(H40)
Channel Numbers	• 11 for 802.11b/802.11g/802.11(H20) • 7 for 802.11n(H40)
Channel Separation	5MHz
Modulation Technology	• IEEE 802.11b: Direct Sequence Spread Spectrum (DSSS) • IEEE 802.11g/802.11n: Orthogonal Frequency Division Multiplexing(OFDM)
Transmit Power	+20dBm
Antenna	Ceramic Antenna
Antenna Gain	3dBi
Range	Up to 100 meters (open space)
Security	WPA / WPA2
Note	802.11b/g/n all support 2×2 MIMO

BLE RF Performance	
Radio Operating Frequencies	2360MHz~2500MHz
Radio On-Air Data Rate	1Mbps
Transmit Power	+18.9dBm (RF output configured to +18.9dBm using external PA present on the module)
Receiver Sensitivity @ BLE Mode	96 dBm (Ideal transmitter)
Antenna	Onboard PCB Antenna
Antenna Gain	0dBi
Range	Up to 200 meters (open space)

General Information	
Color	White
Size	90mm x 90mm x 28mm
Weight	TBD
Accessory	• 1 x 5VDC USB Adapter • 1 x Micro USB Cable (1m) • 1 x Ethernet Cable (1m)

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Chapter 4 MeshTek Gateway Architecture

4.1 Block Diagram

The below block diagram gives an overview of a MeshTek Gateway architecture:
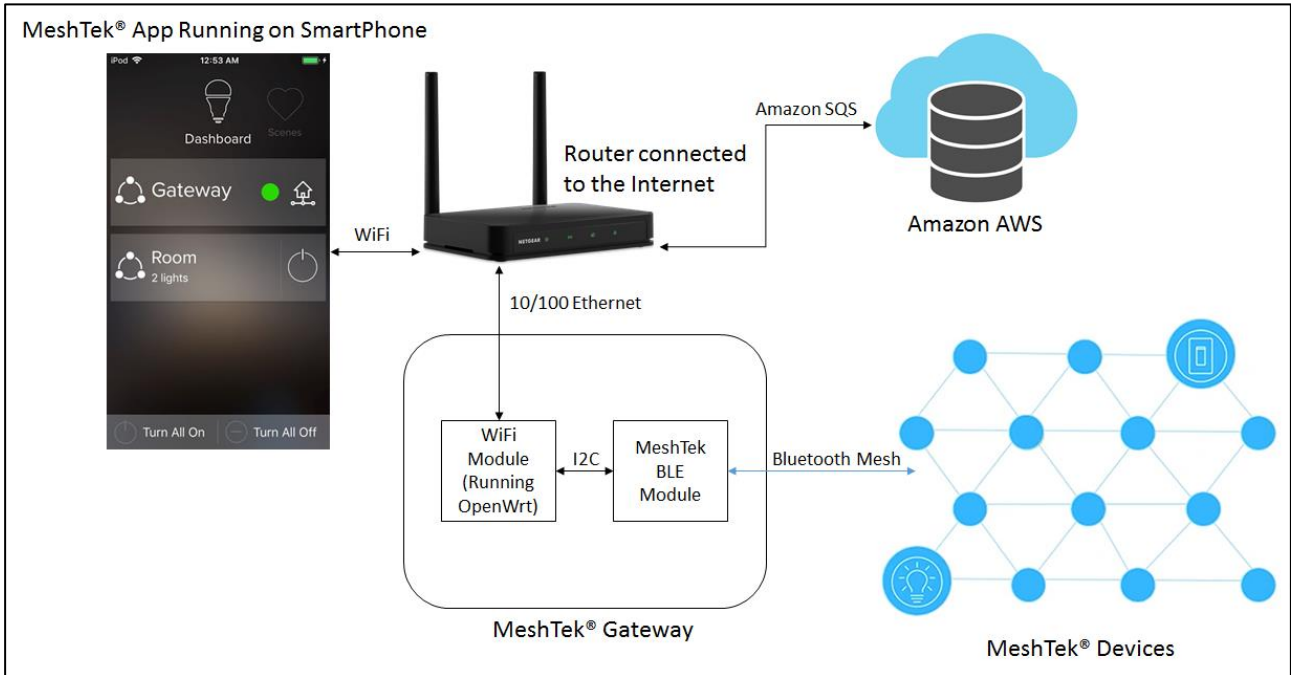
Chapter 5 **Getting Started**

5.1 System Requirement

Following parts should be available with User for setting up the MeshTek Gateway

- WiFi Router with Ethernet port. Port forwarding on port no. 6060 should be enabled.

- MeshTek Gateway with accessory kit

- iOS device (iOS 10.0 and above)

Note: Internet connection should be available in case user wants to remotely control the MeshTek devices.

5.2 Setup

- Connect one end of the Ethernet cable to the Gateway and other end to the WiFi Router

- Enable WiFi and Bluetooth on the iOS device and connect iOS device WiFi to the WiFi Router network

- Download MeshTek app on iOS device and create an account

- Power-on the Gateway

5.3 Adding a Gateway

- User will see the Networks screen. Every Gateway needs to be added as a separate Network. Refer to Section 5.5 on how to Edit and Add a new Network

- Click on the default network "Main" to go to the Dashboard of the Network. Once in Dashboard, the app would automatically search for the Gateway.
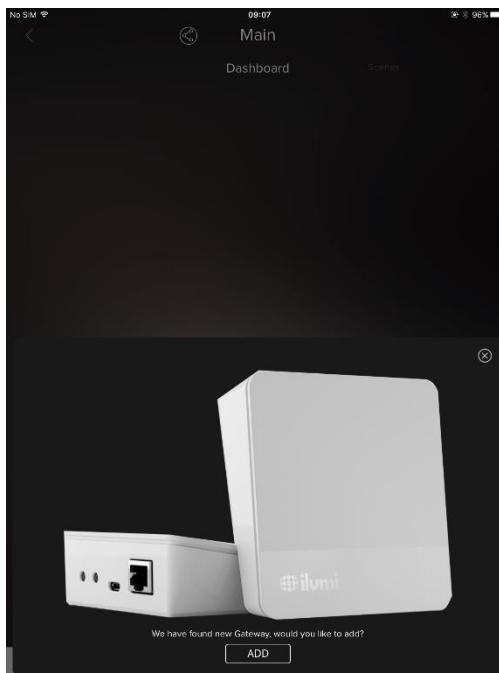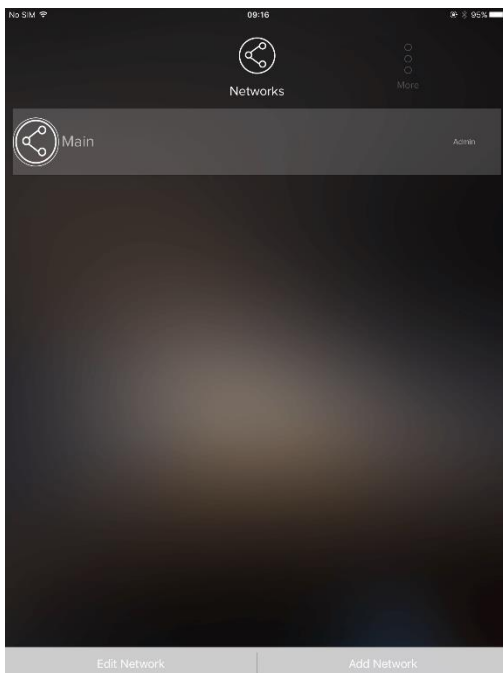
- If User has clicked on the close button then scroll to the right to "More" section and click on "Search for New Gateway"
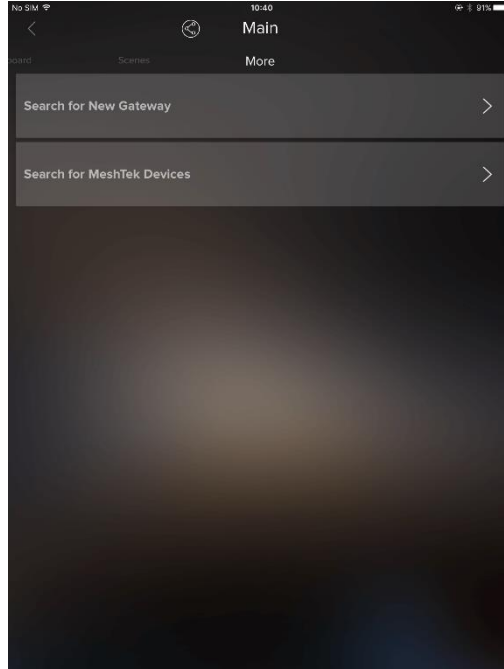

- After the Gateway is detected, follow the instructions available on screen. Click on "Next" and provide name to the Gateway. Click on "Add" button present at the bottom of the screen to move onto the next setup.
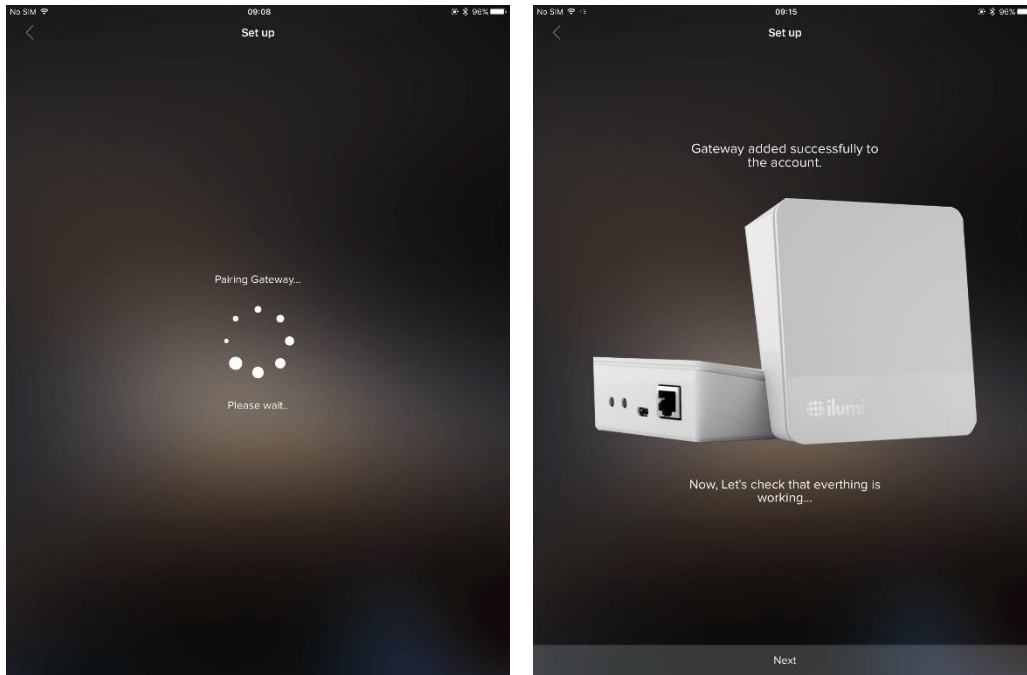
APP would check for Local connection and Gateway Internet.

Local (socket) connection needs to be established between the Gateway and the iOS device as the configuration i.e., User credentials and End node details needs to be synced between the two. *(Note: Local connection would be successful when both the Gateway and iOS device are present on the same local network.)*
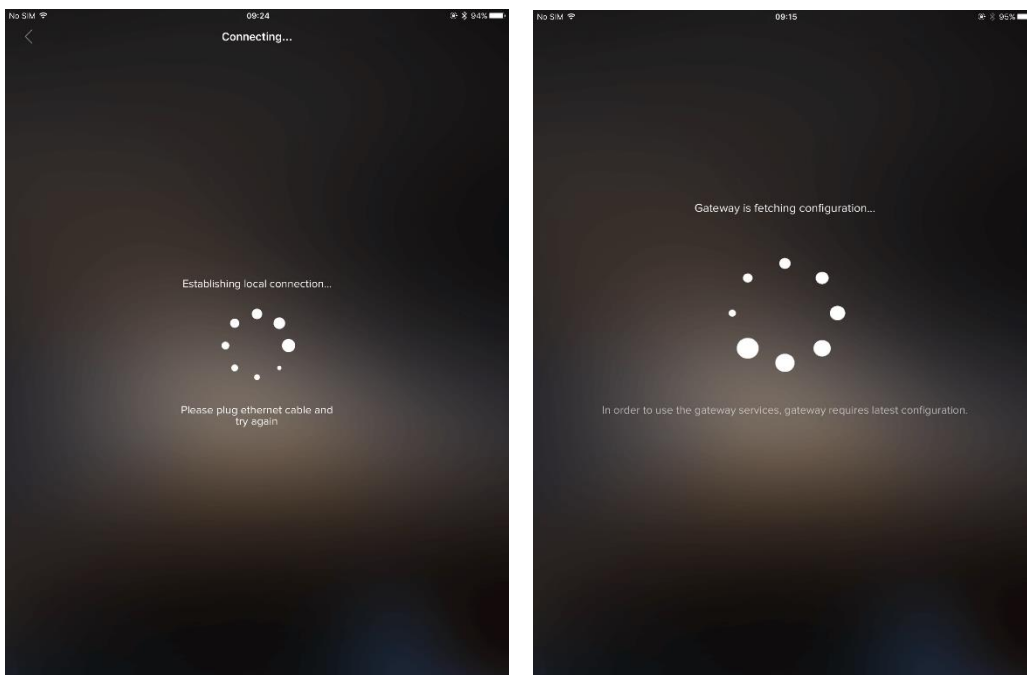
Internet connection on the Gateway would allow User to control the End nodes via APP remotely (via cloud).
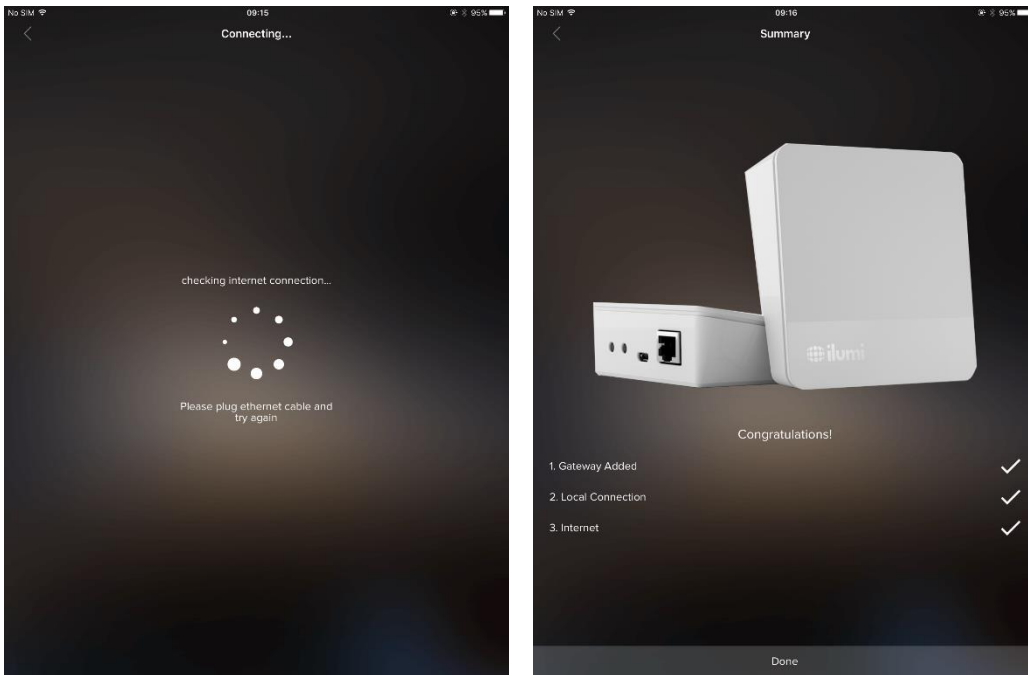
- Gateway is ready for User. Go to the Dashboard screen to see the added Gateway. Click on "Gateway" to check the added Gateway parameters and status of the connection.
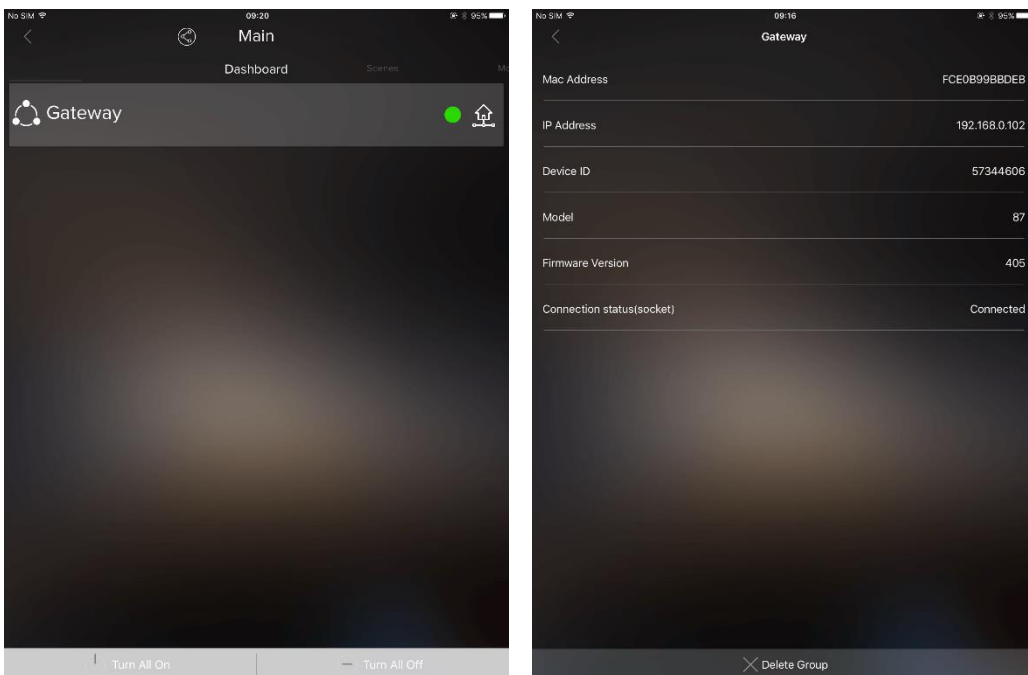
Green dot indicates that the Gateway is online and local connections is successful.

It would turn to Grey when the local connections gets disconnected; it would happen when the Ethernet cable is removed or when the iOS isn't connected to the same network.
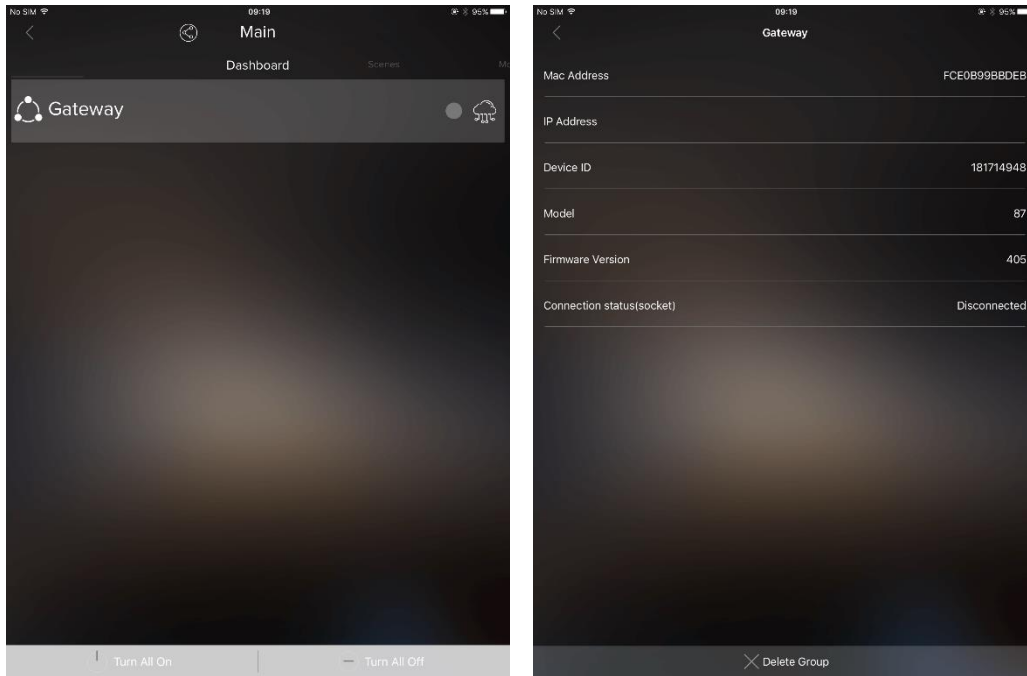
- **As mentioned above, the APP would try to establish local connection and check for the internet before finishing Gateway pairing process. In case both the Gateway and iOS device are not on same local network then the APP would prompt User to "Please plug Ethernet cable and try again". User can decide to click on "Skip" button to finish the paring process.**
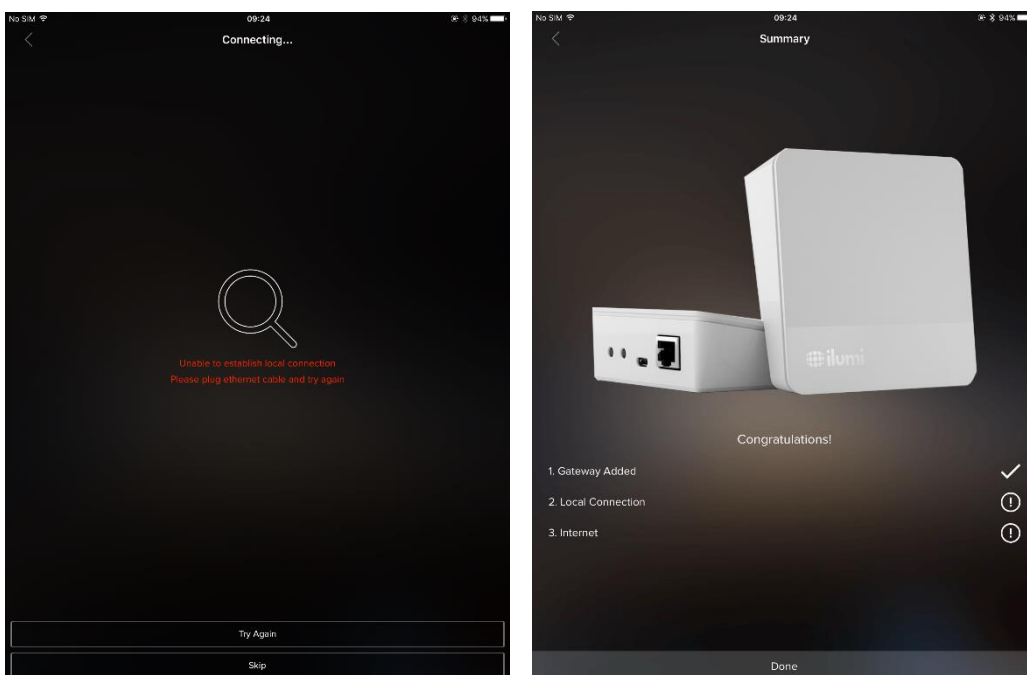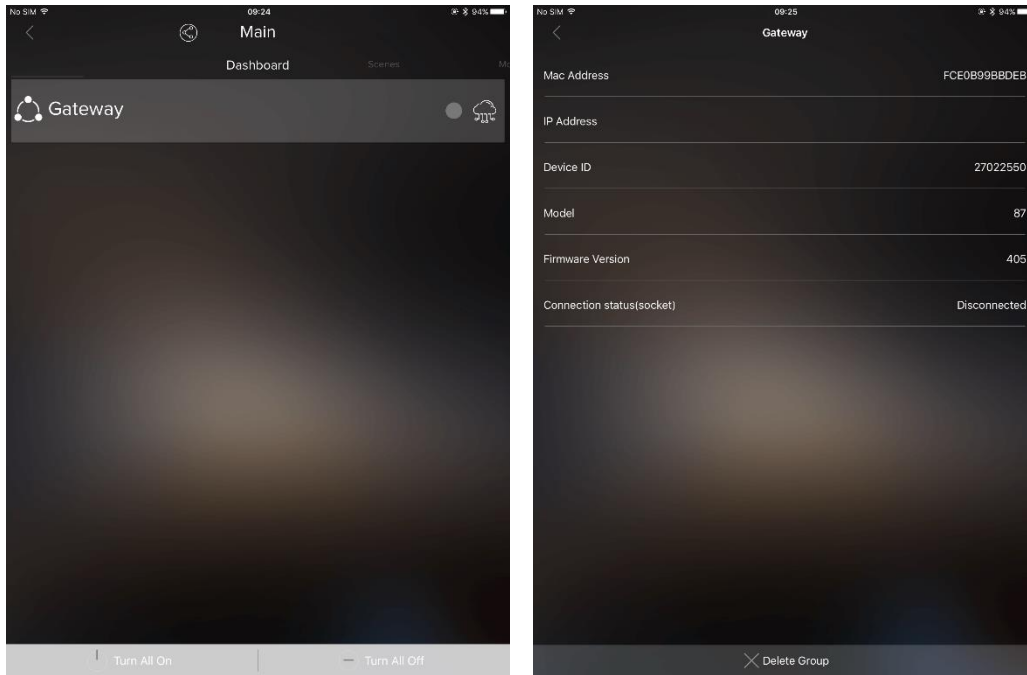
After Ethernet cable is plugged in or both the devices are on the same network then go back to the "Networks" page and the click on the Network in which Gateway was added. Once done, the configuration would be synced as shown below and now the User would be able to control End nodes via Gateway
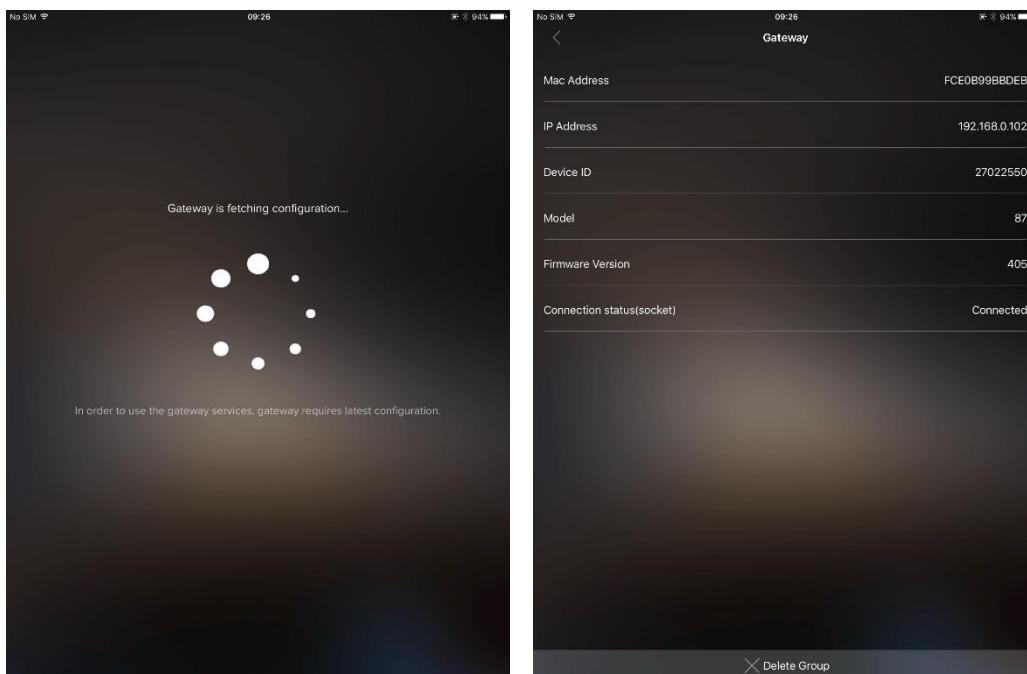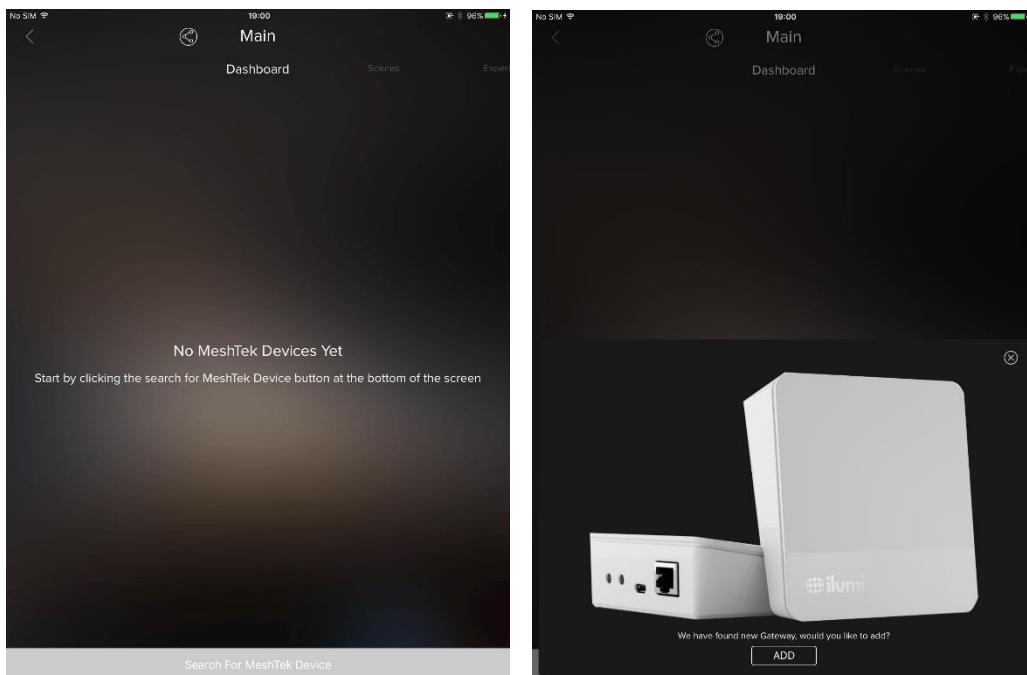
5.4 Deleting a Gateway

- Click on the "Gateway" present on the Dashboard and click on the "Delete Group" button present on the bottom of the screen.
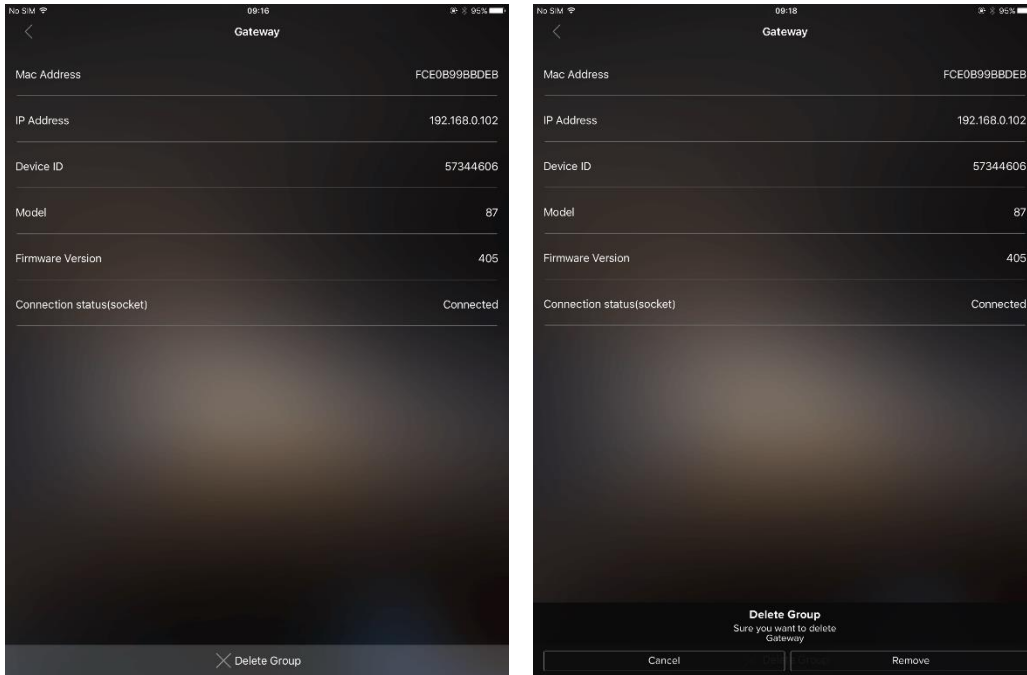

- Once deleted, the Gateway is removed from User's Account and it becomes available for pairing again.

5.5 Adding and Editing a Network

For larger installations (End nodes > 20) more than one Gateway would be required. User needs to create a new Network for each Gateway.

- Click on "Add Network" button present on the bottom right of the Networks page. Give the logical name and description to the Network and click on "Save".
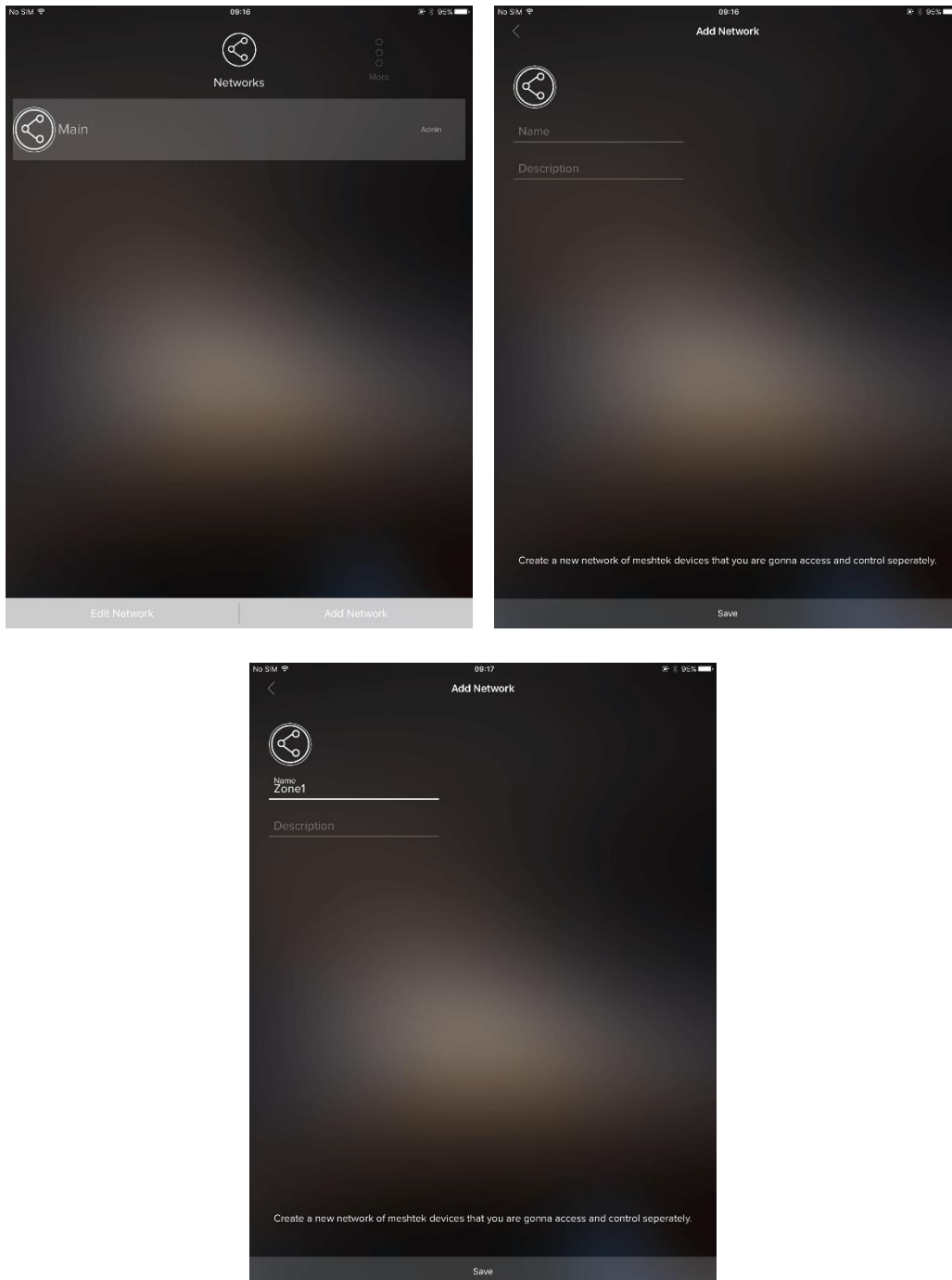
- Click on "Edit" button present on the bottom left of the Networks page. Edit icon would appear against each of the Network, by clicking on the icon you can Rename, Change Photo or Delete the Network as shown in below images.
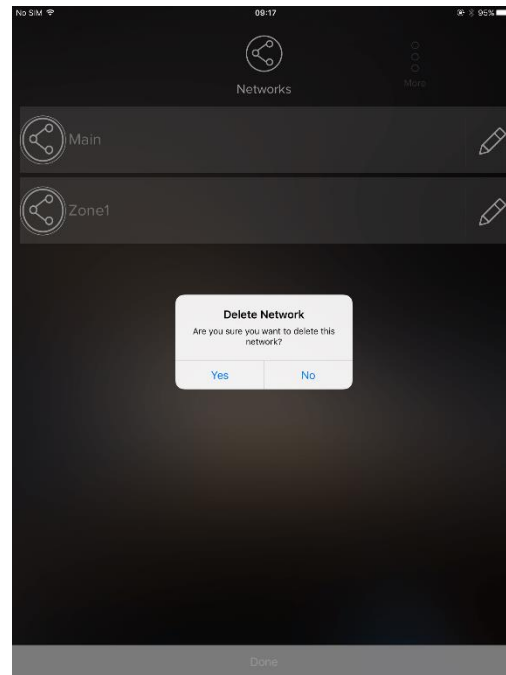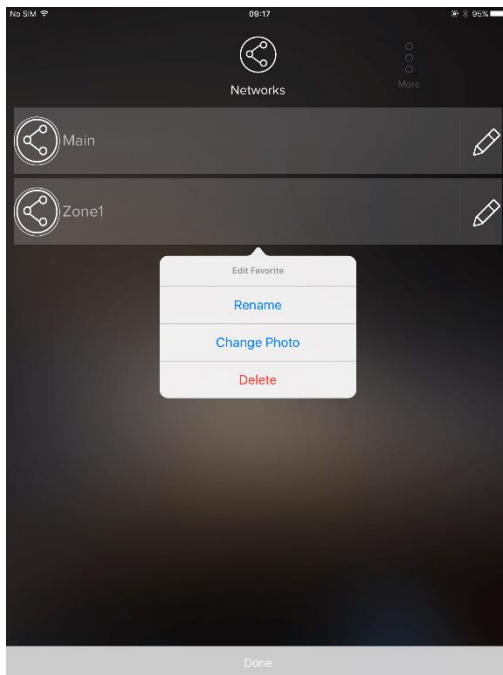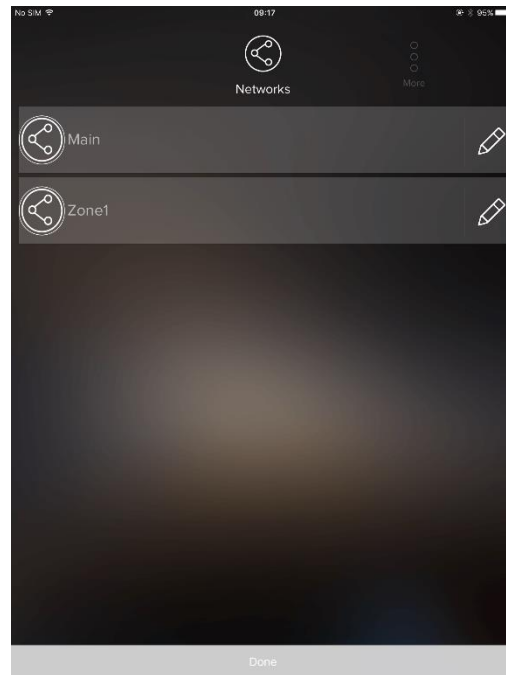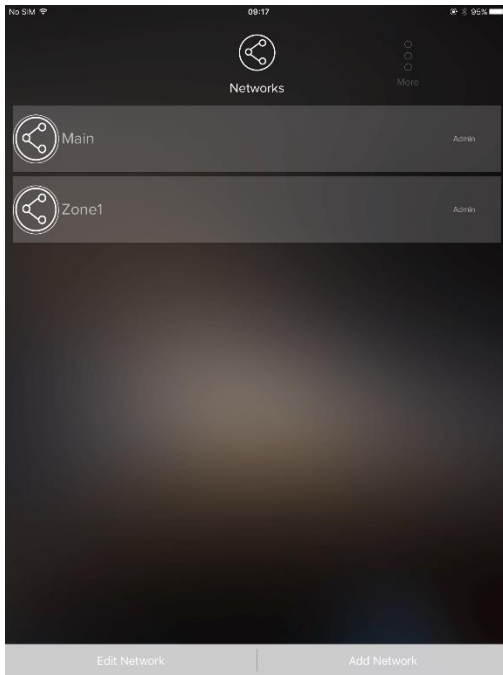
Chapter 6 Revision History

Revision	Date	Status / Comments
1.0	Jan 2019	Initial Release
1.2	March 2019	Updated Getting Started section